

REMARKS

Claim 23 is incorporated into claim 1 and claim 23 is cancelled. Claim 10 is cancelled. Claim 16 is amended to recite "diameter" in place of "radius". The amendments are supported by the application as originally filed. No new matter is added by the amendments.

The specification is amended to correct typographical errors. "Radius" is amended to read "diameter" to accurately describe the dimension "c" shown in figure 5. Paragraph 0069 and the heading of Table 2 are amended to describe shrinkage of dielectric layers (m) as a function of the number (n) of constraining layers. No new matter is added by the amendments.

Claim 10 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicants traverse the rejection to the extent that it can be maintained. Claim 10 is cancelled.

Claims 1-7, 19, 25, and 28-29 are rejected under 35 U.S.C. §102(a) as being anticipated by Knickerbocker et al. (US 6,607,620). Applicants traverse the rejection to the extent that it can be maintained.

Applicants' invention relates to an improved method for reducing shrinkage of multilayer ceramics during low temperature sintering. Shrinkage occurs during sintering as a result of plasticizers and binders being driven off and the ceramic and heterogeneous materials being densified (para. 4 of application). The claimed method reduces shrinkage of a monolithic structure comprising a dielectric body, a constraining layer and bonding glass applied therebetween. The constraining layer is bonded to the dielectric body through the bonding glass thereby reducing shrinkage during sintering (figure 7 and para. 50 of application).

In sharp contrast, '620 discloses a method for constraining shrinkage during processing of greensheets prior to sintering, e.g. punching, screening, drying, stacking and laminating of greensheet (column 3 lines 32-42). A frame is bonded to a greensheet prior to processing and subsequently removed from the greensheet after processing (Summary of the Invention). The frame is removed from the greensheets before laminated greensheets are sintered (column 2 line 11 and column 4 line 42). Further, among the group of suitable materials for the frame are polymers and cellulose that would not survive sintering temperatures and therefore would not prevent shrinkage of the greensheet during sintering of the ceramic (column 4 lines 10-27). The

entire teaching of '620 is directed to process steps prior to sintering. Also, the '620 patent fails to disclose a bonding glass layer applied between the constraining layer and dielectric body. Applicants respectfully submit that US 6,607,620 does not anticipate claims 1-7, 19, 25, and 28-29 and request that the rejection on this ground be withdrawn.

Claims 1-19, 22, 25, and 28-29 are rejected under 35 U.S.C. §103(a) as being unpatentable over Knickerbocker et al. (US 6,607,620) in view of Flaitz et al. (US 5,130,067). Applicants traverse the rejection to the extent that it can be maintained.

Applicants respectfully point out that only claim 22 that depends from claim 1 is limited by application of a Z-direction force. As discussed above, Knickerbocker et al. disclose a


process wherein frame members (constraining materials) are used to control shrinkage during processing and are cut away prior to sintering (column 4 line 42). Flaitz et al. disclose a process for controlling Z-direction camber and X-Y bulge and distortion by applying pressure to the surface of a green ceramic structure during sintering. Flaitz et al. disclose several embodiments of their invention including the use of "contact sheets" that rely on friction to control shrinkage (beginning at column 8 line 65). The contact sheets must not fuse to the ceramic and are removed from the ceramic after sintering. There is no teaching or suggestion by Flaitz et al. of a process that controls shrinkage during firing of a monolithic structure that includes bonding glass applied between the contact sheet (constraining layer) and the ceramic layer (dielectric body). Applicants respectfully submit that the combination of Knickerbocker et al. and Flaitz et al. fails to teach or suggest all of the steps of the claimed method and request that the rejection on this ground be withdrawn.

Applicants note that claims 20-21, 23-24 and 26-27 are deemed allowable if rewritten to include all of the limitations of claims from which they depend. In light of the amendments and comments above, Applicants respectfully submit that these and the remaining claims are now allowable.

In view of the above amendments and remarks, Applicants respectfully request a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Respectfully submitted,

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Date


Brian H. Batzli
Reg. No. 32,960
MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, MN 55402-0903
Telephone: (612) 332.5300
BHB/OAO

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